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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR		ATTORNEY DOCKET NO.
09/042,681	03/12/98	ISHIDA	A	MAT-5870

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EXAMINER	
CREPEAU, J	
ART UNIT	**PAPER NUMBER**
1745	14

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No.	Applicant(s)	
	09/042,681	ISHIDA ET AL.	
	Examiner	Art Unit	
	Jonathan S. Crepeau	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *18 October 2000* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *16-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15)☒ Notice of References Cited (PTO-892)
16)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
18)☐ Interview Summary (PTO-413) Paper No(s). _____ .
19)☐ Notice of Informal Patent Application (PTO-152)
20)☐ Other: .

DETAILED ACTION

Response to Amendment

1. This Office action addresses newly presented claims 16-30. Claims 22-24 and 26-29 are rejected under 35 USC 103 for essentially the reasons of record. Claims 16-21, 25, and 30 are newly rejected under 35 USC 103, as necessitated by amendment. Accordingly, this action is made final.

Claim Rejections - 35 USC § 103

2. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peled et al (WO 94/24715). Peled et al. teach a lithium polymer secondary battery comprising a positive electrode (made of lithium transition metal compound oxide), negative electrode and polymer electrolyte (separator) on page 6, first paragraph. A ceramic (alumina) not relating to charge and discharge is contained in the electrolyte, which is contained in the anode (see Example 22). The ceramic is granular with a particle size of 0.05-0.5 microns, and is contained in the electrolyte in a quantity of 1-20 volume %. (see page 4, first full paragraph). In Example 22, Peled et al disclose a 6% volume fraction of alumina in the electrolyte, resulting in a the weight percentage of alumina in the alumina/anode active material (coke) mixture of 17.4% (according to the examiner's calculations using densities obtained from the *Prokon* software package of 3.965 and 2.1 g/cc for alumina and coke (amorphous carbon), respectively).

In Example 22, Peled et al do not explicitly teach in a weight percentage of ceramic to (ceramic + active material) under 9.09% (according to the maximum percentage of the instant claims obtained by dividing 10 by (100+10)). However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would realize that the alumina volume percentage in Example 22 could be 1%, based on the broader disclosure of volume percentage on page 4. Carrying out the same calculations as above, this results in an alumina weight percentage of 3.4%, thereby overlapping with Applicant's claimed range. In the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists (*In re Wertheim*, 191USPQ 90; *In re Woodruff*, 16 USPQ2d 1934).

Response to Arguments

Applicant's arguments filed October 18, 2000 have been fully considered but they are not persuasive. Applicants assert that Peled et al. do not disclose a separator between the positive and negative electrodes. The Examiner, however, notes that the solid electrolyte of Peled et al. is inherently a "separator," because it separates the positive and negative electrodes. The instant claims also do not specify the material the separator is made of. Therefore, this recitation is still not considered to distinguish over the Peled et al. reference.

3. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peled et al. as applied to claims 22-24 above, and further in view of Tsukamoto et al (U.S. Patent 5,677,084).

Peled et al. do not explicitly teach a positive active material comprising $LiCoO_2$.

In column 6, lines 63-65, Tsukamoto et al. teach a lithium secondary battery comprising $LiCoO_2$ as a positive active material.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would have sufficient motivation to use $LiCoO_2$ as the positive active material of Peled et al. In the cited passage, Tsukamoto et al. teach that $LiCoO_2$ has a high voltage and a large energy density. Accordingly, the artisan would be motivated to use $LiCoO_2$ as the positive active material of Peled et al.

4. Claims 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peled et al. in view of Tsukamoto et al. as applied to claim 25 above, and further in view of Kawakami (U.S. Pat. 5,888,666), or Blonsky (U.S. Pat. 5,648,011).

Peled et al. further teach that the ceramic (alumina, silica or magnesia) is incorporated in the polymer electrolyte and cathode, as taught on page 4, first and second full paragraphs, and page 6, last sentence of first paragraph (the polymer electrolyte may also be incorporated in the composite cathode). The main component of the composite electrolyte is polyethylene oxide (PEO), as taught on page 5. An organic electrolyte solution dissolving lithium salt is taught on pages 4 and 5.

Peled et al do not explicitly teach that the polymer electrolyte is a gel.

Kawakami teaches a polymer gel which may comprise PEO in the paragraph starting in column 9, line 43.

Blonsky teaches a gelled electrolyte including a gelling agent made of alumina in the abstract.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because either of these references show that the polymer electrolyte of Peled et al could be termed a "gel". Kawakami teaches a number of polymers that are inherently gelled materials, including PEO. Therefore, the artisan may surmise that while Peled et al call their electrolyte a "composite solid electrolyte," the polymer component of the electrolyte is really a gel. Additionally, Blonsky teaches that silica, alumina, and magnesia are all used as gelling agents in an electrolyte. Therefore, the artisan may surmise that because alumina (a gelling agent) is used in the polymer electrolyte of Peled et al, the electrolyte must then be a gel.

Response to Arguments

Applicant's arguments filed October 18, 2000 have been fully considered but they are not persuasive. Applicants assert that the PEO disclosed by the Peled et al. reference (having a molecular weight of lower than 7,200,000) is a water-soluble polymer and therefore does not meet Kawakami's definition of a gel as a polymer which is "insoluble in a solvent" (see col. 9, line 47 of Kawakami et al.). However, the Examiner does not find this argument persuasive.

While the PEO disclosed by Peled et al. may be water-soluble, there is no evidence to suggest that it is soluble in an organic solvent such as that used as the electrolytic solution of Peled et al. Kawakami et al. simply state that a polymer must be "insoluble in a solvent"; the particular solvent is not disclosed. Thus, absent evidence that PEO is soluble in the organic solvents used by Peled et al., this ground of rejection is maintained.

Regarding the disclosure in column 10, lines 6-64 of Kawakami et al., which Applicants rely upon as a teaching that the polymers must be converted to a gel by a specific process (such as crosslinking), the Examiner contends that the artisan would realize that the polyethylene oxide of Peled et al. would contain crosslinked chains. As evidence of this, the artisan may look to the patent of Chang et al. (5,545,496), where in column 2, lines 26-36, it is disclosed that "[s]olid electrolyte compositions comprising a polymeric network interpenetrated by an ionically conducting liquid are well known the art.....Typically, these solid electrolyte compositions contain a solution of a conductive salt...in an aprotic solvent which forms a continuous phase in a crosslinked polymer such as polyethylene oxide." Thus, from this teaching, the artisan would be apprised that polyethylene oxide is typically crosslinked when used as a solid electrolyte material, and therefore may also be defined as a "gel" (since Kawakami discloses that gels are formed by crosslinking).

5. Claims 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Angell et al (U.S. Patent 5,849,432) in view of JP 7-153495.

In Example 17 (col. 14, lines 30-50), Angell et al. teach an electrochemical cell comprising a carbon anode, an $LiCoO_2$ composite cathode, and a polymer gel electrolyte including an $LiClO_4$ salt and a BEG:LiEC organic solvent. In addition to the $LiCoO_2$, the composite cathode comprises the gel polymer electrolyte.

Angell et al. do not explicitly teach that the composite cathode contains a ceramic (i.e., alumina) not relating to charge and discharge of the battery).

In the abstract, JP 7-153495 teaches a lithium secondary battery comprising an $LiMn_2O_4$ active material and a ceramic (alumina) not relating to charge and discharge.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of the Japanese reference to incorporate alumina particles into the composite cathode of Angell et al. In the abstract, the Japanese reference teaches that capacity deterioration of the battery can be prevented by adding the ceramic particles to the positive electrode which comprises a lithium transition metal oxide. Accordingly, the artisan would have sufficient motivation to incorporate alumina particles into the composite cathode of Angell et al.

Additionally, the Japanese reference discloses that there are preferably 2 parts of alumina for 87 parts of lithium manganese oxide (on a 100-part basis, this is equal to 2.3 parts alumina for 100 parts $LiMn_2O_4$). Accordingly, since 2.3 falls within Applicant's claimed range of 0.01 to 10, this disclosure is considered to render this limitation obvious.

Regarding the particle size of the alumina, this is a parameter which may be optimized by the artisan to achieve a particular result. For example, by decreasing the particle size, the surface

area is increased, which would allow more beneficial interaction within the positive electrode. It has been held that when the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation (In re Aller, Lacey, and Hall, 105 USPQ 233).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's acting supervisors, Steve Kalafut or Carol Chaney, can be reached at (703) 308-0433 and (703) 305-

3777, respectively. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

Documents may be faxed to (703) 306-3429. The official fax number for documents of extreme importance is (703) 305-3599 (it will take longer to receive documents faxed to this number; therefore the first number is preferred).

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

STEPHEN KALAFUT
PRIMARY EXAMINER
GROUP 1700

JSC

December 29, 2000